REMARKS

Applicants will cite to the paragraph number of the published patent application (PG Pub) of the present application, i.e., US 2006/0237124, when discussing the application description below, rather than to page and line of the specification as filed.

The rejections under 35 U.S.C. § 103(a) of:

Claims 1-3, 6 and 8-13 as unpatentable over US 6,416,856 (Crandall) in view of US 5,620,775 (LaPerre), US 5,514,441 (Pohto et al), US 6,416,188 (Shusta et al), and US 6,355,302 (Vandenberg et al);

Claims 4 and 7 as unpatentable over the above combination of references, and further in view of US 6,592,700 (Wang et al); and

Claim 5 over the above combination of references, including Wang et al, and further in view of "Applicant's admitted prior art",

are all respectfully traversed.

As recited in above-amended Claim 1, an embodiment of the present invention is a continuous method for producing a printed retroreflective material for making articles of clothing, said articles of clothing having a minimum coefficient of retro-reflection ($cd/1x.m^2$) indicated by European Standard EN 471/1994 (related to high visibility warning clothing) and/or EN 13356/2001 (related to visibility accessories for non-professional use), said method comprising:

(a) providing a carrier sheet with an adhesive on the carrier, thereby forming a support layer;

(b) partially embedding onto the adhesive a monolayer of transparent glass microspheres having a refractive index between about 1.4 and about 2.7, to a depth between about 35-40 percent of their average diameter, thereby forming a web material;

(c) coating a thin layer of a two-component polyurethane resin;

(d) applying a specularly reflective mirror of aluminum by vacuum deposition;

(e) printing a non-etchable transfer pattern onto the aluminum layer, thereby forming a transfer image;

(f) passing said web material through a demetallization bath of sodium hydroxide and a washing station to remove etchable, non-protected surface and drying the web;

(g) applying, by a vacuum process, two layers of dielectric mirror;

(h) coating a polyurethane binder layer and laminate with a textile base; (i) stripping away the support layer.

(Emphasis added).

As discussed in greater detail below, none of the applied prior art discloses or suggests the above-emphasized steps. Indeed, by carrying out these steps, a product is obtained, as shown in Fig. 6 of the specification herein.

The Examiner relies on Vandenberg et al as, in effect, disclosing or at least suggesting above-emphasized steps (e) and (f). As now discussed, Vandenberg et al neither discloses nor suggests these steps.

Vandenberg et al discloses a continuous process for making high performance retroflective fabric. Vandenberg et al discloses that methods currently used (i.e., at the time of Vandenberg et al) to make such fabrics on a commercial basis fall into three basic types, one of which is referred to as the "release liner" process (column 2, line 7ff). Vandenberg et al's invention is disclosed as an improvement over the release liner process because it does not require the use of any release liner (column 3, lines 8-13). Vandenberg et al's process is carried out by applying a coating of binder material to a fabric, applying aluminum-coated microspheres (beads), wherein the aluminum substantially covers the entire outer surface of each bead (column 4, lines 59-61), to the coating of binder material such that each of the

beads is partially embedded in the binder material and partially exposed to the atmosphere, and then removing the portion of aluminum coating exposed to the atmosphere using an etching agent that does not attack the underlying glass bead or substantially damage the surface of the glass bead, which etching agent is preferably an alkali solution (column 4, line 3 through column 6, line 3, and Figs. 5, 5a-5d, 6 and 7). Fig. 7 shows an embodiment wherein the binder material is applied in a discontinuous layer rather than in a continuous layer over the entire front surface of the fabric as in Figs. 6 and 5, such that the binder material is formed as a pattern, and the beads that are applied adhere to the fabric only where the discontinuous layer of binder material is present (column 8, lines 24-44). Additionally, Vandenberg et al distinguishes the reflectorized fabric made by their invention, as shown in Fig. 5d, from a reflectorized fabric made by a release liner process of the prior art, as shown in Fig. 4 (paragraph bridging columns 6 and 7), thus, in effect, teaching away from the use of a release liner process.

Without the present disclosure as a guide, one skilled in the art would not have combined Crandall and the other applied prior art, with Vandenberg et al. Crandall is an example of a prior art release liner process. If anything, if one skilled in the art were to combine Crandall and the other prior art with Vandenberg et al, the result would be a process closer to that of Vandenberg et al, not that of Crandall. Nevertheless, none of Vandenberg et al's steps suggest presently-recited steps (e) and (f) of the present invention.

In Vandenberg et al, whether a pattern is formed with the beads, as discussed above with regard to Fig. 7 thereof, or no pattern is formed, the same etching step is applied to each bead, i.e., all the exposed aluminum is etched but aluminum on the embedded part of each bead remains. In the final product, each bead embedded in the binder material is the same; there is no pattern. Thus, in Vandenberg et al, the result is a **homogeneous** layer of

hemispherically aluminized beads. This is completely different from the present invention, both in the process and in the final product.

In the present invention, after the glass beads are embedded in the carrier sheet, polyurethane resin is applied to the glass bead-containing web material, aluminum is deposited thereon, whereby the aluminum necessarily is deposited on so-called "isles", i.e., where the beads are, and on the so-called "sea", i.e., on the areas between the beads [0024]. Then, unlike Vandenberg et al, as recited in step (e) of Claim 1, a non-etchable transfer pattern is printed onto the aluminum layer, and then the demetallization bath in step (f) removes the aluminum not protected by the non-etchable transfer pattern. Thus, in the present invention, only the exposed parts of the beads are coated by the aluminum, and only part of this aluminum is removed based on the transfer pattern.

The above should be sufficient to demonstrate patentability herein. The following is offered as additional background and understanding of the present invention compared to Vandenberg et al.

For a pattern to appear on a retroreflective surface one of the following conditions must be realized:

A. An alternation of half metallized bead regions (high-visibility retroreflection, i.e., 300-500 cd/lx.m^2 or HVR zones) with bare fabric;

B. An alternation of half metallized bead regions (HVR zones), with transparent bead (latent retroreflection, i.e., 5-20 cd/lx.m^2 or LR zones) regions;

C. An alternation of half metallized bead regions (HVR zones) with regions in which beads are "coated/masked" in such a way that light propagation is avoided.

Vandenberg et al et al discloses a pattern formation according to caption A.

The present invention is drawn to a pattern formation according to caption B, containing metallized regions, i.e., isles, as discussed above, and transparent regions, i.e., sea, as discussed above.

In the process of the present invention, a pattern is realized on the release liner after metallization by "selective demetallization" of the liner. The patterned metallized layer can be realized in two ways:

a) Patterned protection of zones of metallized beads before a homogeneous etching treatment bath;

b) Patterned etching via a screen-printing /printing roll machine (as described in Examples 3 and 4 herein).

In a later step, a binder layer is homogeneously applied throughout the width and length of the fabrics. Thus, in the coupling stage, the bead transfer is complete and the surface of the product is fully covered with beads, without bare fabric zones, having at the same time the characteristics of a homogeneous/robust release liner product and a detailed retroreflective drawing suitable for high quality fashion uses.

In the caption a) scenario, the patterned protection is realized by partially covering the metallized layer with a thermoplastic printing design; the thermoplastic drawing layer, once heat-transferred over the metallized microspheres, offers selective protection to the etching bath; only beads not covered by the drawing are demetallized. This thermoplastic drawing is not a binder layer in a chemical sense or in a size sense. There are no issues regarding adhesion to the fabric, no structural/mechanical properties are necessary for this design layer, since the binder layer will be applied in any case in a following step. In particular, the thermoplastic layer can be very thin compared to the size of the beads (a few microns) and in any case, a leveling is obtained during the binder layer application. One of the consequences

is that the final product has everywhere a constant thickness, irrespective of the metallized beads (isle) or the transparent bead (sea) regions.

In the caption b) scenario, the liner metallized surface exposed to the etching solution is not protected, but it is the way the etching solution flows through the rotary screen printing, thus being in contact with only a fraction of the metallized surface, that creates alternating regions of metallized /demetallized microspheres. The rotary screen-printing is used to create pattern-like flowing of the etching water solution (approx 1-5 g/m^2) on the metallized surface of the liner, and not to apply a permanent thick polymer-based binder layer on fabrics (usual order of magnitude 30-100 g/m^2).

The process in the present invention leads to a retroreflective product with a much more "sharp-edge", high-quality, retroreflective drawing.

Moreover, according to the present invention, since 100% protection of the surface is realized, the drawing appearance is independent of fabric properties, like fiber color, for example.

Combining Crandall (release liner) with Vandenberg et al et al (etching) would lead to a complete demetallization at the "release liner stage" of no practical use.

A1) Etching at the release liner level after hemispherical vapor deposition will simply lead back to 100 % transparent beads.

A2) Screen printing of the binder on the fabric and coupling to demetallized liner after A1) will lead to a product with alternating zones of transparent beads and bare fabric.

B1) Screen printing of the binder, i.e., applying a patterned binder, to the hemispherically metallized liner, followed by etching and subsequently by coupling to the fabric will lead to the same product as in Vandenberg et al: alternation of retroreflective beads and bare fabric zones. Moreover, the sequence is very likely of no practical use since

even if the binder does not dissolve during etching, its adhesion toward the fabric is compromised.

Graphical representations of the differences in the final product between patterned retroreflective product according to Vandenberg et al and to the present invention, as shown in Figs. 1A, 1B, and 1C (in grey scale), and corresponding 2A, 2B and 2C (in color), are **submitted herewith.**

Figs. 1B or 2B are examples of the final product according to the above-discussed embodiment of Fig. 7 of Vandenberg et al. Figs. 1C or 2C are examples of the final product according to the present invention.

Note that in Vandenberg et al, bare fabric is exposed on the surface. In the present invention, on the other hand, the bead layer is continuous throughout the product; a pattern emerges by alternation of metallized and non-metallized beads, providing HVR and LR zones, respectively; the binder is "visible" behind transparent beads in LR zones. Fig. 2C highlights the fact that the color of the surface is independent of fabric color if a pigmented binder is used.

For all the above reasons, it is respectfully requested that the rejections over prior art be withdrawn.

The rejections of Claims 1-13 under 35 U.S.C. § 112, second paragraph, is respectfully traversed. Indeed, the rejection would now appear to be moot. Accordingly, it is respectfully requested that the rejection be withdrawn.

The rejection of Claims 7 and 8 under 35 U.S.C. § 112, first paragraph, is respectfully traversed. Indeed, the rejection would now appear to be moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that the rejection be withdrawn.

The objection to Claim 9 is now moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that the objection be withdrawn.

All of the presently-pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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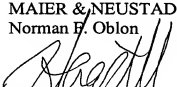

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